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Ch. 1

Introducing the cluster paradox: highlighting problematic areas of the knowledge-based theory of clusters

Abstract

This chapter serves the purpose of introducing the cluster paradox, with the explicit aim of addressing problematic issues related to the so-called knowledge-based theory of clusters and with a special focus on the concept of local buzz. Doing so, this chapter takes stock of recent theoretical and empirical developments in this matter, and specifies where the main contribution of this dissertation lies. This results in two distinct yet related research questions aimed at advancing our understanding of both local and inter-local knowledge dynamics. Having positioned the grand research theme for this dissertation, the Amsterdam IT and new media-cluster (AINM-cluster) is demarcated in terms of geography and business activities. Finally, the four studies reported in the following chapters are elaborated on.

1.1 | Positioning of dissertation

In today's reality, the pervasiveness of the *globalization*-phenomenon increasingly becomes manifest. With the rise of the Internet, which swiftly is becoming the dominant medium for human communication, global connectivity has become an ubiquity rather than a privilege for the happy few. As such, the production of culture, information, knowledge, and innovations has changed dramatically over the course of

the past two decades (Flew, 2005; Benkler, 2006). Increasingly, it appears, the production of information, knowledge, and innovations is the domain of social production mechanisms irrespective of geographical boundaries and obstacles (*ibid.*). The development of the GNU/Linux-operating system, with more than one million registered users and contributors worldwide, serves as a successful example of the social production of innovations.¹ Peer production of innovations has dramatically changed in scope, scale, and efficacy over the past decades (*ibid.*).

Policymakers worldwide enthusiastically adopted the ‘cluster-toolkit’ with the explicit aim of creating local knowledge and innovation hotspots

In light of these developments it appears paradoxical, to say the least, that policymakers and scholars alike rely on spatial agglomerations of economic activity for the realization of economic growth, prosperity, and the production of innovations. Spurred by Michael Porter’s views on the wealth of nations in the early nineties (Porter, 1990) and Richard Florida’s notion of the rise of the creative class at the turn of this millennium (Florida, 2002), policymakers worldwide enthusiastically adopted the ‘cluster-toolkit’ with the explicit aim of creating local knowledge and innovation *hotspots* (Bahlmann & Huysman, 2008; Martin & Sunley, 2003; Breschi & Malerba, 2001, Wever & Stam, 1998; Audretsch, 1998). Doing so, policymakers draw inspiration from yet unparalleled success stories such as Silicon Valley (USA), Baden-Württemberg (Germany), and the Emilia-Romagna-region (Italy).

Currently, clusters are particularly valued for allowing entrepreneurs to tap into the ‘local’ buzz (Bathelt *et al.*, 2004). This buzz, which can be understood as a highly implicit form of knowledge, has been described to consist of “specific information and continuous updates of this information, intended and unanticipated learning processes in organised and accidental meetings (...)” (*ibid.*, 38). The accidental and unanticipated nature of buzz, that is considered so typical for this type of knowledge interaction, allows the entrepreneur in question to absorb and mix different information streams from different parties in relatively little time. It is a form of

¹ The development of the GNU/Linux-operating system serves as an example of free software development through peer production. Other examples might include Wikipedia, the clickworkers-experiment by NASA, or the SETI@home-project.

exchange entrepreneurs do not necessarily solicit for, but are likely to stumble upon simply as a result of their involvement in, and association with a particular cluster. The concept of local buzz constitutes a novel and interesting turn in the ongoing discourse on the nature and value of knowledge spillover effects (also called knowledge externalities), i.e., the value of clusters from a knowledge-based perspective. This latest development in cluster literature is, however, not without controversy. As will come under discussion in the remaining part of this introductory chapter, the buzz theorem is the issue of debate in terms of its spatial nature specifically. Where proponents of the buzz theorem have heralded the concept of buzz as the “hallmark characteristic of clusters” (Gertler & Wolfe, 2006: 218), skeptics question the extent to which this local buzz is exclusively and automatically available to cluster based entrepreneurs (Saxenian, 2006), thereby questioning the essence of the knowledge-based theory of clusters. This dissertation addresses this very issue, thereby advancing our understanding of the knowledge spillover rationale in general, and the concept of local buzz specifically.

The remaining part of this chapter is organized as follows. First, some of the key assumptions characterizing cluster literature in general, and the knowledge-based theory of clusters specifically, will come under discussion. Second, the area to which this dissertation intends to contribute is introduced. This section is followed by a demarcation of and elaboration on the research setting. To conclude this chapter, an elaborate overview of the contents of chapters 2 to 5, which form the heart of this dissertation, is provided.

1.1.1 Key assumptions

Clusters can be defined as agglomerations of similar and related business activity. Central to policymakers’ adoption of the cluster-toolkit as policy panacea, is the quest for creating fruitful conditions for innovative business activity to emerge and prosper (as well as the associated positive effects in terms of economic prosperity and growth). Important to mention in this context, is that innovation is no longer regarded as the result of processes taking place within the boundaries of (research and development) firms. Rather, inter-firm (and inter-personal) networks, both formal and informal, increasingly are considered to play a pivotal role in the

innovation process (West, Vanhaverbeke & Chesbrough, 2006; Rogers, 1995; Von Hippel, 1994).

A key assumption in much of the literature on clusters and innovation is that firms located inside a cluster perform better than similar firms outside a cluster because of better access to the local knowledge network (Zaheer & Bell, 2005). Put differently, being located in a local knowledge network is considered to enhance an entrepreneur's creativity, learning, and innovative capacities. As such, the spatial clustering of economic activity supposedly enhances processes of interactive learning (Bathelt, Malmberg & Maskell, 2004; Boschma, 2005), and subsequently fosters regional economic revitalization and intensified innovation. These learning processes are assumed to be spatially sticky due to their context specific nature. This implies that actors can only share new, creative ideas effectively when sharing a similar social context which is, to a large extent, assumed to be defined locally (Sole & Edmondson, 2002; Gertler, 2003).

Thus, it is considered advantageous for entrepreneurs to be located in a cluster, surrounded by similar and related entrepreneurs with whom they can interact (Bathelt *et al.*, 2004). In addition, the co-location of similar and related entrepreneurs is said to increase competition and rivalry, thus serving as a strong incentive for both innovation and product- or service differentiation (Porter, 1990; 1998). Being located in a cluster enhances an entrepreneur's ability to constantly monitor and compare his/her offerings to that of his/her competitors. Policymakers' adoption of this perspective is nicely illustrated by means of box 1.1, in which it is clearly stated that "industrial clusters underline the benefits of knowledge sharing, which is the basic reason for firms to congregate together" (APEC, 2005). This dissertation serves the purpose of scrutinizing the above outlined rationale, especially in light of the ubiquity of ICTs (Flew, 2005). Although the cluster-concept emerged well over a century ago (Marshall, 1920), the concept continues to be subject to ambiguity and doubt, resulting in "conceptual and empirical confusion" (Martin & Sunley, 2003: 10). Especially with the rise of the knowledge-based theory of clusters (e.g. Arikan, 2009; Bahlmann & Huysman, 2008; Maskell, 2001), which explains the existence of clusters based on their assumed value as facilitators of knowledge sharing and interactive learning, cluster literature appears to have moved from a mono-disciplinary

approach, firmly rooted in traditional economics, into a multidisciplinary field of study incorporating elements from sociology, geography, and business studies.²

In a similar vein, cluster literature has experienced conceptual and empirical confusion with respect to claims made about a cluster's assumed unique knowledge characteristics. Marshall (1920) for instance, conceptualized cluster specific knowledge as "the mysteries of the trade" which "*are as it were in the air*" (Marshall, 1920: 225), allowing traditional economists to treat (tacit) knowledge as a public good confined by geographical borders (Krugman, 1991). Or, as Amin & Cohendet (2004: 90) describe it, "learning and innovation are cast as regional properties, with spatial proximity and local belonging read as the vital economic asset for learning-based competitiveness." With the entrance of other academic disciplines to the cluster discourse, this view on the apparently public nature of tacit knowledge, as

Box 1.1: Illustration of policymakers' adoption of the cluster toolkit

Advantages of Industrial Clustering

The ability to innovate under globalization is the key to the competitiveness of an economy. Industrial clusters are favorable for the establishment of such an ability and enable SMEs to sustain both their development and innovation capabilities. It is well known that there are several advantages for firms, especially SMEs, within an industrial cluster.

First of all, it can provide complementary resources, such as technology and information exchange, management assistance, and so on, to enhance the performance of the firms. Industrial clusters underline the benefits of knowledge sharing, which is the basic reason for firms to congregate together. The information and knowledge shared within a cluster are less related to technology development, and more related to marketing and other factors that affect firm performances.

Secondly, since these firms are located in very close proximity to one another, industrial clusters make regional competition that much keener, thus promoting firms' efficiencies. Fierce competition for both clients and suppliers is unavoidable. (...)

Finally, the adoptions of new information technologies, ICT, do not threaten, but rather enhances cluster viability and vitality. ICT infrastructure alone would not have the same effect. The interaction between cluster dynamics and ICT infrastructure produce the types of benefits. SMEs, located outside a cluster, would not gain as much from the use of the ICT infrastructure even if with a strong reputation. Presence in a branded cluster helps remote clients find SMEs, and trust them to perform the kinds of activities needed.

Source: APEC Best Practice Guidelines on Industrial Clustering for SMEs (March 9, 2005)

² See chapter 2 of this dissertation for an in-depth outline of the rise of the knowledge-based view of clusters.

well as its assumed tendency to stick *spatially*, has come to be the subject of fundamental criticism and subsequent inquiry.

1.1.2 From pure agglomeration to a network view of knowledge transfer

The entrance of other academic disciplines is especially apparent when examining the range of available definitions of the cluster concept, expressing the subsequent large amount of perspectives available on the topic of clusters. Since Marshall's pioneering work on industrial clusters, or *industrial districts* as he initially preferred to address the concept (1920), the field of research evolved from a multidisciplinary field – with contributions from, among others, the field of economy (e.g. Marshall, 1920;

Knowledge is, despite its public nature, difficult to codify and de-contextualize, i.e. tacit, and thus bounded by geographical space.

Schumpeter, 1934; Krugman, 1991), business strategy (e.g. Porter, 1990), economic history (Jacobs, 1969), and economic geography (e.g. Scott, 1996, 2006; GREMI) – into an interdisciplinary field. But most notably, as the definitions gathered in table 1.1.2 illustrate, a distinction can be made between pure

agglomeration based definitions of clusters (e.g. Maskell & Kebir, 2005; Bresnahan, Gambardella & Saxenian, 2001; Rosenfeld, 1997) and those that allow for the entrance of community or network based terms and phrases like 'interconnected companies' (Porter, 1998b) and 'networks of production' (Marceau, 1999).

The entrance of network based concepts has changed the field of study dramatically, thereby changing perspectives on the role of clusters in light of local and non-local knowledge transfer. The rise of network perspectives on knowledge transfer in the field of economic geography is related to the earlier noted dissatisfaction with prevailing explanations of knowledge exchange, most notably, the knowledge spillover rationale (e.g. Breschi & Lissoni, 2001a/b; Breschi & Malerba, 2001; Bathelt et al., 2002; Martin & Sunley, 2003; Amin & Cohendet, 2003).

Breschi & Lissoni (2001a/b) break the rationale concerning "localized knowledge spillovers" (LKS) down in a three step chain. First, it is assumed that knowledge generated or created within firms and institutions (e.g. universities) in one way or another is conveyed to other firms or institutions. Second, this knowledge is argued

to be of a public nature. Third, this knowledge is, despite its public nature, difficult to codify and de-contextualize, i.e. tacit, and thus bounded by geographical space. The knowledge in question not only involves technology and market related knowledge, but also strategic knowledge (what are my competitors up to) and relational knowledge (who's good at what, and who's not; who's reliable, and who isn't) (Brown & Duguid, 2000).

Table 1.1.2: Defining the cluster concept

Author(s) and definition	Subject of analysis
<i>Becattini</i> (1990: 38): "I define the industrial district as a socio-territorial entity which is characterized by the active presence of both a community of people and a population of firms in one naturally and historically bounded area."	Italian industrial districts
<i>Swann & Prevezer</i> (1996: 1139): "Clusters are (...) defined as groups of firms within one industry based in one geographical area."	Computing and biotechnology
<i>Rosenfeld</i> (1997: 4): "A 'cluster' is very simply used to represent concentrations of firms that are able to produce synergy of their geographic proximity and interdependence, even though their scale of employment may not be pronounced or prominent."	MUS furniture cluster and Italian stockings and hosiery cluster
<i>Porter</i> (1998b: 78): [Clusters are] "geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and ass. institutions (...) in particular fields that compete but also cooperate."	Pottery, automotive, medicine, biotech., <i>et cetera</i> .
<i>Baptista & Swann</i> (1999: 374): "(...) we define clusters as strong collections of firms within one industry concentrated in the same geographical area."	US and UK computer industries
<i>Marceau/OECD</i> (1999: 157): "Clusters are characterized as networks of production of strongly interdependent firms, knowledge-producing agents and customers linked to each other in a value-adding production chain."	Australian clusters in general
<i>Bouwman & Hulsink</i> (2000: 380): [A clusters is a] "geographical concentration of mutually dependent companies, active in the same branch of industry or using the same basic technology, with both vertical and horizontal as well as cooperative and competitive relation patterns."	Dutch New Media cluster
<i>Bresnahan, Gambardella & Saxenian</i> (2001: 836): "We define a regional cluster simply as a spatial and sectoral concentration of firms (...)."	Multiple regions, all ICT related
<i>Maskell & Kebir</i> (2005: 1): "Clusters may be defined as non-random geogr. agglomerations of firms with similar or closely complementary capabilities."	No subject of analysis in particular

A considerable amount of critique is directed at the prevailing notion that companies within a cluster have – almost – exclusive access to knowledge that appeals to the tacit dimension of Polanyi (Håkanson, 2003). Breschi & Lissoni (2001a) very briefly put it as follows:

“(...) we are not denying that knowledge flows are an extremely important agglomeration force, and that a very large part of these flows takes place at the local and regional level. What we question is the strategy of putting all these flows under the common heading of LKSs, (...) as soon as one tries to open the black-box of LKSs, it becomes quite clear that:

- *what might appear at first as ‘pure’ knowledge externalities are actually ‘rent’ (or pecuniary) externalities, which are mediated by economic (market and non-market) mechanisms, such as the labour market and firm networking;*
- *what might appear as involuntary (pure or rent) knowledge externalities are actually well-regulated knowledge flows across firms, or between research institutions (or individuals therein) and firms, that are managed with deliberate appropriation purposes” (ibid.: 270).*

Breschi & Lissoni thus question whether knowledge spillovers in fact occur outside the “control” of economic mechanisms or firms, i.e. that the knowledge that is supposed to spill over in fact are knowledge flows mediated by labor economies, social ties, or deliberately managed knowledge transference. Knowledge spillovers being inherently of a public nature is being questioned or even contested.

A number of approaches have been deployed in an effort to make the concept of LKS more robust, and to part from the ambiguity to which Breschi & Lissoni (2001a) refer. The concept has been approached through focusing on (1) labor economies; (2) spin-offs; and (3) social networks. These three elements are all, either in combination or separately, argued to influence the spillover of knowledge to occur.

The argument involving the influence of labor economies on the concept of LKS is simple and straightforward. Knowledge spillovers tend to occur due to labor mobility

(Almeida & Kogut, 1999; Power & Lundmark, 2004). Knowledge is argued to simply “walk out the door” (Simard & West, 2006: 11) as employees change jobs. A firm’s knowledge thus ends up at one of its competitors, suppliers, or customers.

The spin-off thesis is argued to be another important source of LKS, and very much relates to the labor economy argument. Spin-off firms, by definition, originate from existing firms in the cluster (Dahl *et al.*, 2005). It simply means that employee A leaves his/ her employer, company B, to set up his own firm, company C. Employee A will naturally take with him/ her part of the knowledge (skills, experience, education, market know how) he or she generated while employed at company B. And very often spin-off firms establish themselves in the same cluster their founder’s previous employer is active in (*ibid.*). An interesting contribution comes from Acs *et al.* (2005), by noting a relationship between LKS and entrepreneurship. Being exposed to LKS increases the likelihood of recognizing market opportunities, which consequently fosters entrepreneurship. This argument very much relates to the spin-off thesis. Knowledge, again, simply appears to walk out the door.

A somewhat more complex argument involves the assumed relation or association between LKS on the one hand, and social networks on the other. An important aspect of this view entails the perception of firms being social communities (Kogut & Zander, 1992; 1993; Zander & Kogut, 1995). As a consequence, social interaction is regarded to be an important element with respect to sharing and creating knowledge as well as learning and innovation (Powell, Koput & Smith-Doerr, 1996; Kogut & Zander, 1996; Feldman & Florida, 1994), paving the way for the social network argument. This social network argument is part of what has been called the network or associational paradigm (Morgan, 1997). Adherents of this perspective are keen on arguing that mobilizing resources is not just a matter of market or hierarchy. Instead, the network as organizational form is proposed in order to overcome dualisms such as state versus market, *et cetera* (*ibid.*).

Networks are regarded as powerful assets with respect to accessing power, information, knowledge, and capital (Elfring & Hulsink, 2003). Especially in a competitive environment characterized by a highly complex and evolving knowledge base, as well as scattered sources of expertise. (Powell *et al.*, 1996). Networks thus might be considered important learning devices, or entry devices for entering an

environment that contains knowledge that is widely available, though either not easily produced within the boundaries of the firm or acquired through market transactions (*ibid.*).

Specifically, the social network argument entails the notion that social relationships are crucial in obtaining tacit forms of knowledge (Sorenson, 2003). Given that “birds of a feather, flock together”, it is not surprising that these social networks appear to be dependent on proximity. A relationship’s durability is said to be strongly influenced by geographic proximity, as it proves to be easier to maintain relationships over short distances (*ibid.*), i.e. it aids face-to-face interaction (Feldman & Florida, 1994). Finally, social networks involve a degree of mutual trust and understanding, which is argued to foster the transfer of tacit forms of knowledge (Conway, Dawley & Charles, 2005).

1.1.3 *The theoretical problem exposed*

Whereas both the spinoff-argument and the labor market rationale are more or less accepted explanations as enablers of local knowledge spillovers, the social network argument is still the issue of debate. More specifically, the social network argument is contested for it doesn’t fully account for the notion that knowledge travels vast distances (Saxenian, 2006; Amin & Cohendet, 2004; Oinas, 1999). This perspective explains why knowledge exchange is bounded by cluster boundaries, but fails to convincingly explain why knowledge, in particular in its tacit manifestation, could not or should not travel beyond such boundaries through social ties. In addition, it heavily relies on the assumption that tacit knowledge is sensitive to space as well. To understand this position, an examination of the underlying rationale is in order.

In so doing, we limit ourselves to an entrepreneurial perspective, for entrepreneurs are considered prime beneficiaries from agglomeration economies. In addition, entrepreneurship is, in turn, considered pivotal to the emergence of successful clusters (e.g. Bresnahan *et al.*, 2001; Dahl, Pedersen & Dalum, 2005; Feldman & Francis, 2004; Kenney & Von Burg, 1999; Feldman, 2001). From this perspective Bresnahan *et al.* note that the start of a cluster involves “building the economic fundamentals for an industry” (2001: 842) in the first place, but needs an entrepreneurial spark to really get it going. Related to that, Dahl *et al.* (2005) argue

that the initial success of the pioneering firms is crucial to the generation of new firms that ultimately leads to the establishment of a cluster. In other words, the initial success of firms generates enough spin-offs for a grouping of firms to evolve into a cluster. The spin-off card is also played by Maskell (2001) as one of the factors affecting cluster growth. In addition, Feldman & Francis (2004) even propose a shift in unit of analysis, arguing that the motives and constraints experienced by entrepreneurs might shed light on the process of cluster formation.

The local character of social networks

Clusters are considered pools of opportunities and resources, increasing the likelihood for firms to get involved in the opportunities available. Clusters of firms might be approached as having enduring competitive advantages due to their unique local characteristics. Clusters can be considered unique bundles of knowledge, opportunities and resources which are hard to copy on a global scale (Porter, 1998b; Fuchs, 2000). Given that regional clusters are bundles of opportunities and resources, a social capital perspective of the region seems plausible. As Bourdieu (1991) notes, social capital serves as a credential which may entitle one to various forms of credit. The degree of social capital relates to one's degree of embeddedness in an economic environment, meaning that the nature of one's dyadic relationships as well as the network in which these relationships are embedded, shapes economic action.

The notion of embeddedness is argued to have a substantial influence on economic life (Granovetter, 1985; Gulati & Gargiulo, 1999; Baum & Oliver, 1992; Uzzi, 1996). Sorenson (2003; 2003b) argues that having specific types of social relations, like for instance strong ties or high social cohesion, are argued to be conducive to transferring tacit knowledge, to enhance the process of opportunity identification, and to access critical resources. Whom you know, thus, can be considered a constraint in terms of what you know and which opportunities and resources become available. This means that one must access a social network first in order to identify and utilize opportunities present in the cluster (Sorenson, 2003). This is especially relevant from an entrepreneurial point of view, for entrepreneurs draw considerably on their social network (Greve & Salaff, 2003; Sorenson, 2003b). First, entrepreneurs access or utilize networks in order to obtain an awareness of profitable opportunities.

Obtaining this information often means getting acquainted with people currently involved in a particular cluster (Sorenson, 2003b). Second, entrepreneurs draw particularly on their social ties in obtaining the necessary knowledge, skilled labor, and capital during the process of building a firm (*ibid.*). Or, as Gordon & McCann maintain:

“Industrial clusters (whether spatial or not) differ from the agglomeration model in that there is a belief that such clusters reflect not simply economic responses to the pattern of available opportunities and complementarities, but also an unusual level of embeddedness and social integration” (2000: 520)

The value of an entrepreneur’s social network and, indeed, the process of building one, basically reflects “a prior accumulation of trust, circumstances which facilitate monitoring of others’ behaviour, a source of leadership and/or a sense of common interest, as well as the expectation of significant gains” (*ibid.*). Many of these pre-conditions are facilitated by the closeness or geographical proximity, especially in the case where economic relations have been more local, or where a distinctive local economic and cultural base is present (*ibid.*).

Entrepreneurs, hence, are to access and build a local social network – i.e., become locally embedded – in order to access the knowledge and opportunities available in the cluster. In addition, actors most frequently interact with others in close geographical propinquity, as well as to those with whom actors share similar backgrounds. In turn, geographical proximity is considered to be very important to the “durability of relationships by reducing the costs of maintaining a relationship” (Sorenson, 2003: 515). With this in mind it appears to be justified to conceptually link the concepts of regional clusters, social networks, and knowledge.

This perspective doesn’t suggest that social networks are inherently regionally orientated, but social networks do have explicit spatial applications (Gordon & McCann, 2000). Networks are regarded as a “durable form of social capital, created (and maintained) through a combination of social history and ongoing collective action” (*ibid.*: 520). Entrepreneurs thus establish themselves in close proximity of the industry in which they intend to be active, for the social ties that facilitate access to

knowledge, opportunities, and resources hardly ever go beyond the region in which these resources are located (Sorenson, 2003b). Geographical proximity is argued to foster social networks by limiting the costs of maintaining relationships (Sorenson, 2003).

Geographies of knowledge

The rationale for linking knowledge to the cluster phenomenon is derived from the assumption that knowledge inherently holds certain tacit qualities that are essentially context-bound (Brown & Duguid, 2000). As mentioned before, adherents of this perspective maintain that knowledge appealing to Polanyi's tacit dimension is "person-embodied, context-dependent, *spatially sticky* and socially accessible only through direct physical interaction" (Morgan, 2001: 15, emphasis added). It is the nature of knowledge that is, in certain cases, argued to be conducive to cluster formation.

A certain degree of geographical proximity thus is argued to foster these knowledge flows, for geographical proximity fosters social contacts (Sorenson, 2003). Geographical proximity hence is believed to foster social proximity by limiting the "costs" of maintaining relationships. Since knowledge transfer is considered to be a social process primarily, geographical proximity therefore influences the extent to which knowledge linkages occur. Geographical co-location is argued to foster social connections among regionally situated actors, thereby influencing the flows of knowledge occurring in the region indirectly.

The state of art described above is criticized, however, for a number of reasons: first, it overestimates the role of local knowledge exchange and does not address the role of knowledge linkages spanning cluster-boundaries; second, this perspective adopts a rather crude distinction between tacit and explicit knowledge; third, questions have risen with respect to the relevance of cluster boundaries in their *geographical* meaning (Breschi & Malerba, 2001; Wolfe & Gertler, 2004; Globberman, Shapiro & Vining, 2005). The most recent contributions studying regional clusters have mainly focused on these subjects.

First, studying clusters as isolated cases has been recognized as a major shortcoming of cluster literature (Breschi & Malerba, 2001). External linkages are

argued to be just as relevant for cluster success as internal linkages, and should not be discarded from academic inquiry. Breschi & Malerba (2001), for instance, argue that external linkages (meaning linkages of participants “belonging” to cluster X with participants “belonging” to cluster Y) are actually vital for establishing and maintaining a strong (dense) local network. In addition, Gertler & Levitte (2003) argue that regions only are in fact dynamic if they are characterized by “dense local social interaction and knowledge circulation, as well as strong inter-regional and international connections to outside knowledge sources (...)” (*ibid.*: 1).

Second, the role and nature of knowledge and information exchanges with respect to the spatial clustering phenomenon requests further attention. Breschi & Malerba (2001) argue that the distinction between knowledge and information as well as between tacit and explicit knowledge is an oversimplification of the concept of knowledge, which affects our understanding of knowledge creation and dissemination.

Third and final, the problem of cluster boundaries is an important conceptual issue to be dealt with. It is unclear where to draw the line with respect to both geographical and industrial boundaries, making the cluster as phenomenon hard to demarcate and, thus, difficult to study. Especially when studying knowledge dynamics, in essence being a form of exchange not hindered by any physical limitations (Amin & Roberts, 2008), boundaries in its geographical meaning do not appear to be a logical factor to play a role. The metaphor of the network has been proposed to resolve the issue of cluster boundaries, where “the network serves as an analytical compromise, in the best sense of the word, between the fixities of the bounded region metaphor and the fluidities of the flows metaphor” (Thrift & Olds, 1996: 333). Essentially, it comes down to this:

“a key issue in economic geography is to determine the impact of geographical proximity on interactive learning and innovation. (...) (T)he importance of geographical proximity cannot be assessed in isolation, but should always be examined in relation to other dimensions of proximity (...)” (Boschma, 2005: 61).

1.1.4 Contribution of dissertation and research aim

The knowledge-based theory of clusters, which is central to this dissertation, is affected by each of the above described basic issues. Departing from Polanyi's (1967) views on the concept of knowledge, scholars in the tradition of the knowledge-based theory of clusters are criticized for not addressing issues with respect to the assumed geographical stickiness of tacit knowledge (Lorenzen, 2005). Still, the main conclusion in this research stream is that "knowledge geographies are determined by the codification of knowledge" (*ibid.*: 402). In other words, the dissemination of tacit knowledge is confined to cluster boundaries, whereas codified knowledge may flow unhindered by any form of space.

Critiques on the view that learning and knowledge exchange are regional properties mainly, stems from the lack of convincing empirical evidence supporting this claim (Oinas, 1999). In addition, evidence has emerged, both anecdotal (Saxenian, 2006) and quantitative (Tallman & Phene, 2007; Owen-Smith & Powell, 2004), suggesting that the role of the local knowledge network in the process of innovation is in need of reconsideration. As a result a new view has emerged, one that emphasizes the innovative potential of linkages crossing cluster boundaries, also called pipelines: "a variety of channels for low-cost exchange of knowledge with relevant hotspots around the globe" (Bathelt *et al.*, 2004: 33; see also Saxenian, 2006). As such, this view moves away from traditional cluster literature with its strong focus on local dynamics, turning its attention to the role of *non-local* knowledge dynamics and its effect on *local* knowledge dynamics.

*The present status-quo
can be understood as a
cluster paradox*

This dissertation is the result of an appreciation of the latest developments in cluster and innovation literature described above (Amin & Roberts, 2008; Tallman & Phene, 2007; Saxenian, 2006). The present status quo can be understood as a *cluster paradox*: on the one hand a dominant stream of literature stresses the spatial stickiness of tacit, non-codified, knowledge, assigning a dominant role to regional clusters as lubricators of the knowledge sharing and innovation process (Bathelt *et al.*, 2004). This theoretical position is most apparent in the global pipelines – local buzz distinction referred to above. On the other hand, however, knowledge is

conceptualized as a form of exchange essentially not affected by any physical boundary (Amin & Roberts, 2008).

The concept of local buzz can be thought of as a response to scholarly critique on the assumed value of regional clusters in facilitating tacit knowledge flows among firms and entrepreneurs (e.g. Oinas, 1999). Local buzz has been suggested to explain the importance of regional clusters, also referred to as knowledge hotspots, in the face of increasing globalization and the increasingly ubiquitous nature of information and communication technologies (ICTs). As such, the matter of how geographical agglomeration of business activity enhances local knowledge dynamics despite the inherent influence of globalization and ICTs, remains of central importance to the field of economic geography. Buzz is posited as a distinctly local form of knowledge exchange, complementing *non-local* knowledge transfers supposedly taking place through so-called pipelines (Bathelt *et al.*, 2004; Storper & Venables, 2004). Buzzing can be considered the “hallmark characteristic of clusters” (Gertler & Wolfe, 2006: 218).

In contrast, Saxenian’s (2006) account of the new Argonauts might be considered exemplary for the view that knowledge potentially travels unhindered by any geographical boundaries. She describes how immigrant engineers, having received their training and education in Silicon Valley, return to their countries of origin to develop as entrepreneurs over there. Setting up businesses in economically vibrant regions in Taiwan, Israel, *et cetera*, they benefit from the local knowledge network while maintaining their contacts in the Silicon Valley area. This results in global tacit knowledge dynamics or *global buzz*. Accounts like these suggest a depreciation of the role of clusters in facilitating knowledge dynamics and innovation processes, and stress the importance of inter-local knowledge flows and entrepreneurship instead.

Based on the works of Saxenian (2006) and Amin & Roberts (2008) – amongst others – relational proximity appears to be a decisive factor in limiting the impact of geography (i.e. geographical proximity). Another line of critique stems from IS-based literature, and revolves around the concept of organizing visions (Swanson & Ramiller, 1997), defined as a set of grand ideas constructed through an ongoing dialogue (Foucault, 1972) by a diverse set of actors (Swanson & Ramiller, 2004). It results in a set of broadly formulated guiding principles, aiding the process of

interpretation, legitimization, and mobilization of specific innovative trajectories, and thereby advancing it towards an institutionalized status quo (Swanson & Ramiller, 1997). The presence of organizing visions is typical for IT and new media-based clusters (e.g. Silicon Valley, Baden-Württemberg, AINM-cluster), but are by no means geographically limited to such clusters. Organizing visions thus can be expected to limit the impact of geographical proximity on knowledge flows for these type of clusters in particular.

As such, the extent to which buzz is indeed a strictly local form of exchange has received widespread support from many authors, but has also been approached with a certain amount of apprehension, based on the potential roles of organizing visions, relational proximity, and additionally, other forms of proximity (Boschma, 2005). These apparently opposing views require reconciliation.

The overall research aim is to contribute to resolving the cluster paradox introduced above, which is most apparent in the (local) buzz theorem. In reconciling the opposing, paradoxical views described above, this study set out to explore and explain local and inter-local knowledge dynamics originating from the Amsterdam IT and new media-cluster (Den Hertog, Brouwer & Maltha, 2000). In doing so, a mixed methodology-approach was adopted in order to shed light on this complex and multidimensional phenomenon, meaning that both qualitative and quantitative methods were applied in an integrative fashion (Morse, 2003; Tashakkori & Teddlie, 1998).

The results are reported over the course of four distinct yet interrelated studies. These four studies were conducted with two overarching research questions in mind, which serve the purpose of advancing our theoretical and empirical understanding of both local and inter-local knowledge dynamics:

1. *What is the role of clusters, operationalized as geographical proximity, in facilitating knowledge flows among entrepreneurs, when accounting for the effects of other forms of proximity?*
2. *To what extent can buzz be considered a strictly local form of exchange, how can this be explained, and what does it imply for the knowledge-based theory of clusters?*

In examining these research questions, the knowledge-based theory of clusters is taken as a point-of-departure. This implies that the results of the studies reported in this dissertation, all of which inspired by the research questions above, are used to reflect on claims made under the umbrella of the knowledge-based theory of clusters. The Amsterdam IT and new media-cluster forms the stage in which these research questions are explored.

1.2 | Demarcating the AINM-cluster

Currently, the Amsterdam-based IT and new media-cluster finds itself at the center of attention of both policymakers and academics, based on the number of policy and academic publications that have appeared on the subject in the past ten years (Cross Media Monitor, 2006/ 2008; Rutten, Manshanden, Muskens & Koops, 2004; Hoogland, 2008; Den Hertog *et al.*, 2000). Interestingly, the AINM-cluster is acknowledged for being one of the main drivers of the Dutch economy as a whole (Cross Media Monitor, 2006), thus pronouncing IT, new media, and the creative industry to be pivotal to Dutch welfare and prosperity. This allows for a close examination of the characteristics and building blocks of the AINM-cluster through a review of both academic and policy publications that have appeared on the subject in the past decade.

The AINM-cluster is considered to give presence to a number of related industries, all in which the creative ethos prevails, to speak with Grabher (2002). The AINM-cluster was identified by Leisink (2000) and the OECD (2002) as the region in the Netherlands with an exceptionally high concentration of IT and new media related activity.³ Fifteen percent of all jobs in the Dutch creative industries are located in the Amsterdam region. This implies that the creative industries are overly represented in Amsterdam, for the relative share of Amsterdam-based jobs in the Dutch economy is 6,4 percent (Rutten *et al.*, 2004). In addition, seventy percent of all optical fiber cables in the Netherlands are concentrated in the city of Amsterdam alone.

³ In this dissertation, the phrases IT (Information Technologies) and ICT (Information & Communication Technologies) are considered synonymous.

1.2.1 Geographical demarcation

The phrase *Amsterdam IT and new media-cluster* is misleading to some extent, for the cluster comprises an area that reaches beyond the formal Amsterdam city-boundaries. The phrase was coined because Amsterdam undoubtedly can be regarded the geographical and economic heart of the AINM-cluster. Formally speaking, however, the AINM-cluster extends from the city of Haarlem all the way to Utrecht (figure 1.2.1).

The logic for allocating these Dutch cities to the same cluster lies in the notion of the presence and relative share of so-called IT and new media in the local economies (Rutten, Manshanden, Muskens & Koops, 2004; Hoogland, 2008). Specifically, three highly interrelated groupings of industries are recognized: (New) Media and Entertainment (NM&E), Creative Business Services (CBS), and IT.

Ten Dutch cities are recognized as drivers of the AINM-cluster, namely: Amsterdam, Utrecht, Hilversum, Amersfoort, Haarlemmermeer, Almere, Haarlem, Nieuwegein, Amstelveen, and Zaanstad (Hoogland, 2006). Table 1.2.1a exhibits the absolute and relative contribution of each city to the AINM-cluster in terms of firms in new media and Entertainment, Creative Business Services, and IT.

As table 1.2.1a clearly shows, Amsterdam contains about one third of all firms in new media, Creative Business Services, and IT in the AINM-cluster. Half of all firms in aforementioned sectors are to be found in the cities of Amsterdam, Utrecht, and Hilversum combined. The total top-ten cities combined account for seventy-two percent of all sector-specific firms in the AINM-cluster, and seventy-eight percent of all sector-specific jobs (see table 1.2.1b). As table 1.2.1b below shows, a significant portion of new media and Entertainment-related *jobs* is concentrated in relatively small city of Hilversum (well over nine-thousand jobs), which can be explained by the



Figure 1.2.1: Geographical depiction of the AINM-cluster (source: Immovator, Cross Media Monitor 2006)

fact that the traditional media (television and radio) were established at this location by means of policy intervention.

Table 1.2.1a: Absolute and relative share of firms in the AINM-cluster (2007) Immovator 2008

	NM&E	CBS	IT <i>Content</i>	IT <i>Services</i>	IT <i>Hardware</i>	IT Total	Total	%
Amsterdam	3,260	3,599	6,081	3,378	388	9,847	16,706	36
Utrecht	667	1,114	1,510	1,272	150	2,932	4,713	10
Hilversum	485	306	729	331	39	1,099	1,890	4
Amersfoort	241	445	537	584	80	1,201	1,887	4
Haarlemmermeer	71	214	225	392	55	672	957	2
Almere	257	416	561	850	108	1,519	2,192	5
Haarlem	255	488	629	463	79	1,171	1,914	4
Nieuwegein	73	160	190	269	31	490	723	2
Amstelveen	114	208	278	303	33	614	936	2
Zaanstad	116	303	318	349	77	744	1,163	3
Total top-10 cities	5,539	7,253	11,058	8,191	1040	20,289	33,081	72
Resid. AINM-cluster	1,718	3,262	3,969	3,489	645	8,103	13,083	28
Total AINM-cluster	7,257	10,515	15,027	11,680	1,685	28,392	46,164	100
%	16	23				61	100	

Table 1.2.1b: Absolute and relative share of jobs in the AINM-cluster (2007) Immovator 2008

	NM&E	CBS	IT <i>Content</i>	IT <i>Services</i>	IT <i>Hardware</i>	IT Total	Total	%
Amsterdam	11,753	10,976	19,410	18,947	5,519	43,876	66,605	30
Utrecht	1,498	5,679	3,411	16,290	1,579	21,280	28,457	13
Hilversum	9,477	732	10,046	2,384	1,101	13,531	23,740	11
Amersfoort	519	3,701	1,235	4,833	727	6,795	11,015	5
Haarlemmermeer	1,774	1,652	2,444	4,156	833	7,433	10,859	5
Almere	649	1,571	1,552	3,508	787	5,847	8,067	4
Haarlem	1,131	1,344	2,007	2,598	724	5,329	7,804	3,5
Nieuwegein	483	593	766	4,606	275	5,647	6,723	2,5
Amstelveen	208	1,450	1,553	2,585	69	4,207	5,865	2
Zaanstad	258	957	694	1,493	359	2,546	3,761	2
Total top-10 cities	27,750	28,655	43,118	61,400	11,973	116,491	172,896	78
Resid. AINM-cluster	6,723	8,398	11,825	19,390	3,729	34,944	50,065	22
Total AINM-cluster	34,473	37,053	54,943	80,790	15,702	151,435	222,961	100
%	15	17				68	100	

1.2.2 Functional demarcation

As mentioned before, three groupings of industries are recognized to compose the AINM-cluster: (New) Media and Entertainment, Creative Business Services, and IT. This section serves the purpose of describing each of these groupings in greater detail. In addition, a more narrow conceptualization of the AINM-cluster are available, which will come under discussion as well.

Starting with the former, rather broad, conceptualization of the AINM-cluster, each grouping of industries is made up of multiple, related subsectors (table 1.2.2a). Close scrutiny reveals a wide variety of business activities grouped together in one single category. A similar yet different conceptualization of the AINM-cluster is provided by Den Hertog, Brouwer & Maltha (2000), who regard four main activities as characteristic to the Amsterdam IT and new media-cluster namely (1) multimedia enabling activities, (2) content distribution activities, (3) content provision activities, and (4) e-marketing (see also Den Hertog & Maltha, 1999).⁴

Table 1.2.2a: Conceptualization of the AINM-cluster Immovator 2008

New Media & Entertainment	Creative Business Services	IT Content	IT Services	IT Hardware
Publishers	Architecture	Advertising	Printing	Production computers
Photography	Advertising	Interior- and fashion design	Reproduction audio, video, and computer media	Production of electrical devices
Film	Interior- and fashion design	Publishers	Telecommunication	Production audio, video, and telecom devices
Broadcasting agencies		Photography	Hardware consultancy	Production medical precision- and optical devices
Production radio and television		Film	Software bureaus	Technical design agencies
Entertainment		Broadcasting agencies	Computer centers, databases, webhosting, websites	
Journalism		Production radio and television	Computer maintenance and repair	
		Entertainment	Network maintenance, security, etc	
		Journalism		
		Games		

⁴ Although Den Hertog *et al.*'s conceptualization of the Amsterdam IT and New Media-cluster (which they term multimedia-cluster) dates back to the year 2000, its broad characteristics make it very much applicable to today's reality still.

The first category of activities involves businesses that are concerned with activities such as the development and production of IT hardware, e-commerce applications, consumer electronics, interface design, web hosting, consulting on e-commerce and internet strategies, business consulting, *et cetera* (Den Hertog *et al.*, 2000: 3). The second grouping of activities taking place in the Amsterdam new media-cluster involves businesses that relate to providing access to the Internet and the distribution of multimedia devices and software (*ibid.*: 3). The third category involves firms creating new formats and concepts, electronic publishing, developing new service concepts, *et cetera*. The final category involves activities related to 'e-marketing': webvertising, media acquisition, marketing communication, *et cetera* (*ibid.*: 4, 8).

Although the AINM-cluster houses a diverse range of industries, all are involved in the production or transfer of creative (online) content. As such, each industry – and the AINM-cluster as a whole – is affected by three fundamental developments: the rise of new media, digitization and convergence.

The rise of the concept of new media can be understood as an idea that captures both the development of new forms of digital media as well as the redevelopment of traditional media with the aim of coping and adapting to the rise of new media technologies (Flew, 2005). The rise of the World Wide Web, for instance, can be considered illustrative for the effect new media exerts on traditional media, both in terms of technological infrastructure and forms of content, communication, and information sharing. To truly understand the impact of new media on today's society, two related developments need to be addressed: digitization and convergence.

Digitization involves the process by which the storage, transfer, and reception of information increasingly occurs in digitized formats as opposed to analogue formats (*ibid.*), leading to profound shifts in the economic composition of modern societies. The growth of informatization, spurred by digitization, has led to a significant growth for sectors involved in the production and distributions of information and communication, as well as a significant use of ICTs in almost every area of economic activity. Nowadays, the contribution of intangible capital to economic prosperity in western society has increased throughout the twentieth century, and outgrown the contribution of tangible capital to economic prosperity (i.e. traditional economic

activities such as agriculture and industry) already at the end of the 1960s (*ibid.*; Abramovitz & David, 2001).

The process of convergence can be understood as the “bringing together of the computing, telecommunications, and media and information sectors” (Flew, 2005). This convergence took place in three domains: first, *functional convergence* captures the notion that information and media content is ever more processed through IT-systems across broadband communication networks (Miles, 1997). This stands in sharp contrast to television and radio signals being exclusively transferred over airwaves, telephony across single-form networks, *et cetera* (Flew, 2005). Second, the notion of *industry convergence* takes stock numerous takeovers and mergers strengthening the links between computing, IT, telecommunications, and media. Third, *convergent products and services* are “forms of media and information content that take advantage of a networked broadband infrastructures, the capabilities provided by digitization, and the scope for interactivity and user customization services” (Flew, 2005: 12).

The issue of convergence is of relevance to interpreting the results from this dissertation. In constructing interview respondent lists for the first phase of empirical data generation, it proved virtually impossible to find entrepreneurs focusing on one single domain, i.e., limiting his/her activities to that of either NM&E, CBS, or IT-domain. Rather, the vast majority of entrepreneurs approached for the qualitative data gathering-phase of this dissertation proved to combine insights and technologies from various domains in their service offerings. For instance, many of the respondents active in the advertising industry (categorized under the heading of CBS in table 1.2.2a) actively and purposefully applied technologies and insights from new media and/or gaming (NM&E and IT-content), signifying an increased level of cross-fertilization across previously separate domains. When being asked about their service offerings, most entrepreneurs acknowledged their convergence-behavior declaring that it is virtually impossible to limit one’s entrepreneurial activities to that of one single domain.

To illustrate this notion, table 1.2.2b (see appendix section) exhibits the complete list of interview respondents who participated in the qualitative data generation-phase of this dissertation. To signify the convergence-phenomenon, a more detailed

set of industry-domain codes was applied, varying from new media (NM), marketing and advertising (MA), to broadcasting media (BM) and consulting (C). The industry-column clearly indicates the convergence-phenomenon.

1.2.3 Economic relevance

The relevance of New Media & Entertainment, the Creative Business Services, and IT to both the Dutch economy and the AINM-cluster are nicely illustrated by means of table 1.2.3. The total added value of New Media & Entertainment, Creative Business Services, and IT in the Dutch economy is over thirty billion Euros in 2004, of which well over one third is realized in the AINM-cluster (ten billion Euros).

Table 1.2.3: Added value of NM&E, CBS, and IT in million Euros (2004) Innovator 2006

	NM&E	CBS	IT Content	IT Services	IT Hardware	IT Total	Total	%
The Netherlands	3,305	3,781	4,783	14,363	4,029	23,176	30,262	100
AINM-cluster	1,544	1,158	2,086	5,274	601	7,961	10,663	35
Total top-10 cities	1,283	866	1,679	3,898	462	6,039	8,188	-
Resid. AINM-cluster	261	292	407	1,376	139	1,922	2,475	-

1.3 | Outline of studies

1.3.1 Study 1: a critical literature review

The theoretical study presented in chapter 2 examines the knowledge component in cluster literature from its origins to the present. By drawing a comparison with the rise of the knowledge-based view of the firm, this review is carried out with the explicit purpose of critically reflecting on policymakers' tendency to approach clusters as so-called repositories of knowledge (Florida, 1995). This study adopts a historical approach to show how this field of study has evolved from Marshall's seminal observations, well over a century ago, to the current state of art. Starting with Marshall's observations dating back to the late 18-hundreds, this study proceeds with discussing Jane Jacob's historical account of *The Economy of Cities* (1969) and the perceived value of inefficiency. Subsequently, the discussion turns to the contributions made by the Italian district-school (Becattini, 1990), Piore and Sabel's

notion of *The Second Industrial Divide* (1984), the GREMI-approach (Aydalot and Keeble, 1989), Porter's *The Competitive Advantage of Nations* (1990), and the learning region (Lundvall, 1996).

The discussion of these major contributions is by no means intended to be exhaustive. Rather, this selection serves the purpose of demonstrating as well as explaining the current dominance of the knowledge-based theory of clusters, as well as understanding how it affects our current appreciation of the cluster phenomenon. As such, this chapter discloses some of the basic assumptions underlying the knowledge-based view of clusters.

1.3.2 Study 2: a qualitative exploration

Study 2 (chapter 3) seeks to critically approach the knowledge-based theory of clusters by gaining an in-depth understanding of the knowledge dynamics characterizing the AINM-cluster through interviews with professionals, policy makers, and entrepreneurs. By means of this study, we augment the recent theoretical debates about the assumed stickiness of knowledge with empirical qualitative data.

This study contributes to this topic by studying inter-cluster knowledge linkages at an individual level of analysis, making use of qualitative social network measures. Central to this case is the AINM-cluster, with a special focus on entrepreneurs engaging in lively inter-cluster exchange of knowledge and debate, resulting in the exchange of new visions and ideas across cluster boundaries. The proposed distinction between local buzz and global pipelines is challenged and complemented by adding a third category of inter-local knowledge exchange: global buzz.

1.3.3 Study 3: a quantitative continuation

Study 3 (chapter 4) builds on study 2 in critically approaching the knowledge-based theory of clusters. Having challenged the pervasive role of clusters in facilitating knowledge dynamics of entrepreneurs, this study sets out to explore under what conditions of proximity knowledge transfer successfully can take place both within and across cluster boundaries.

Its main goal is to assess the relative impact or importance of geographical proximity in facilitating knowledge dynamics among entrepreneurs active in the AINM-cluster. This is done by taking into account other forms of proximity that are theorized to influence knowledge dynamics, namely relational, cognitive, and epistemic proximity (which is the dyadic translation of the concept of organizing visions). Incorporating additional forms of proximity allows for evaluating the relative impact of geographical proximity. The study was conducted among fifty entrepreneurs active in the AINM-cluster and involved the generation of ego-network data, enabling analysis at the individual relationship level. The ego-network data allowed for analyzing 418 dyadic relationships on the effect of various forms of proximity and their role in facilitating 'interactive learning' and 'ease of knowledge transfer'.

The analysis, which was carried out using structural equation modeling, clearly disentangles the roles of geographical, relational, cognitive, and epistemic proximity in facilitating interactive learning and ease of knowledge transfer. Based on this disentanglement, conclusions can be drawn with respect to the relative importance of geographical proximity on knowledge dynamics among entrepreneurs active in the AINM-cluster. These conclusions hold significant implications for the knowledge-based theory of clusters. In addition to this first contribution, the introduction, measurement, and clarifying power of the concept of epistemic proximity can be regarded as the second major contribution of this study.

1.3.4 Study 4: a qualitative and quantitative integration

This study (chapter 5) takes a closer look at the concept of epistemic proximity, which was first explored in study 3 (see 1.3.3). Having established that epistemic proximity matters by means of study 3, in study 4 it is examined *why* epistemic proximity is so important, and *how* it facilitates inter-cluster knowledge exchange among entrepreneurs. Doing so, the concept of epistemic proximity is scrutinized in relation to its facilitative role towards knowledge exchange in buzz interactions. Interview data is applied to develop a better understanding of what is being exchanged in such interactions, and to what extent this type of interaction is

sensitive to space (i.e. geographical proximity). Consequently, survey data is used in order to verify the qualitative results generated through the interviews.

In essence, this study examines the spatial sensitiveness of buzz interactions, which can be regarded a core element of the knowledge-based theory of clusters. By examining this mode of interaction specifically, a better understanding is developed of the role of clusters as facilitators of knowledge exchange among entrepreneurs.

1.4 | Related publications

The results presented in this dissertations have appeared in a number of international journals/ conferences. An outline of this output is presented in the table below.

Table 1.4: Journal and conference papers

Chapter	Output
Ch. 2	Bahlmann, M.D. & Huysman, M.H. (2008). The emergence of a knowledge based view of clusters and its implications for cluster governance. Literature review, appeared in <i>The Information Society</i> , 24(5), 304-318.
Ch. 3	Bahlmann, M.D. (2008). On tacit knowledge flows crossing oceans and continents: the case of the Amsterdam new media-cluster. Empirical paper presented at the 24 th <i>EGOS Colloquium</i> , July 2008, Amsterdam (The Netherlands). Bahlmann, M.D., Huysman, M.H., Elfring, T. & Groenewegen, P. (2008). Clusters as vehicles for entrepreneurial innovation and new idea generation – a critical assessment. Empirical paper presented at <i>Dynamics of Institutions and Markets in Europe (DIME)</i> , September 2008, Newcastle upon Tyne (UK). Bahlmann, M.D., Elfring, T., Groenewegen, P., Huysman, M.H. (2009). Global pipelines or global buzz? A micro-level approach towards the knowledge-based view of clusters. Empirical paper presented at the <i>2009 Academy of Management Meeting</i> , August 2009, Chicago (USA).
Ch. 4	Bahlmann, M.D. (2009). Does distance matter? Advancing our understanding of the geography of innovation. Conceptual paper presented at <i>OLKC 2009</i> , April 2009, Amsterdam (The Netherlands). Bahlmann, M.D. (2009). Does distance matter? Advancing our understanding of the geography of innovation. Conceptual paper presented at the 25 th <i>EGOS Colloquium</i> , July 2009, Barcelona (Spain).

	<p>Bahlmann, M.D., Elfring, T., Groenewegen, P. & Huysman, M.H. (2010). Does distance matter? An empirical exploration of the geography of innovation. Empirical paper presented at <i>OLKC 2010</i>, April 2010, Boston (USA).</p> <p>Bahlmann, M.D., Elfring, T., Groenewegen, P. & Huysman, M.H. (2010). Does distance matter? An ego-network approach towards the knowledge-based theory of clusters. Empirical paper presented at the 26th <i>EGOS Colloquium</i>, July 2010, Lisbon (Portugal).</p> <p>Bahlmann, M.D., Elfring, T., Groenewegen, P. & Huysman, M.H. (2010). Does distance matter? An empirical exploration of the geography of innovation. Empirical paper accepted for the <i>Best Paper Proceedings of the 2010 Academy of Management Meeting</i>, August 2010, Montreal (Canada).</p> <p>Current status: under review at <i>Organization Studies</i>, revise and resubmit.</p>
Ch.5	Data and findings from this chapter will be applied in the process of revising and resubmitting chapter 4 to <i>Organization Studies</i> .

1.5 | References

- Abramovitz, M. & David, P. (2001). Two centuries of American macroeconomic growth: from exploitation to resource abundance to knowledge-driven development. *SIEPR discussion paper no. 01-05*, Stanford Institute for Economic Policy Research, Stanford University, Stanford, CA.
- Acs, Z.J., Audretsch, D.B., Braunerhjelm, P. & Carlsson, B. (2005). The knowledge spillover theory of entrepreneurship. *CEPR Discussion Paper Series*, No. 5326, 1-38.
- Almeida, P. & Kogut, B. (1999). Localization of knowledge and the mobility of engineers in regional networks. *Management Science*, 45(7), 905-917.
- Amin, A. & Cohendet, P. (2004). *Architectures of knowledge. Firms, capabilities, and communities*. Oxford University Press. New York.
- Amin, A. & Roberts, J. (2008). Knowing in action: beyond communities of practice. *Research Policy*, doi: 10.1016/j.respol.2007.11.003.
- Arikan, A.T. (2009). Interfirm knowledge exchanges and the knowledge creation capability of clusters. *Academy of Management Review*, 34(4), 658-676.
- Audretsch, D.B. (1998). Agglomeration and the location of innovative activity. *Oxford Review of Economic Policy*, 14(2), 18-29.
- Aydalot, Ph. & Keeble, D. (1989). High-technology industry and innovative environments in Europe: an overview. In: Ph. Aydalot & D. Keeble (eds.). *High technology industry and innovative environments: the European experience*. Routledge, UK, 1-21.
- Bahlmann, M.D. & Huysman, M.H. (2008). The emergence of a knowledge-based view of clusters and its implications for cluster governance. *The Information Society*, 24(5), 304-318.
- Baptista, R. & Swann, P. (1999). A comparison of clustering dynamics in the US and UK computer industries. *Journal of Evolutionary Economics*, 9, 373-399.
- Bathelt, H., Malmberg, A. & Maskell, P. (2004). Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation. *Progress in Human Geography*, 28(1), 31-56.
- Baum, J.A.C. & Oliver, Ch. (1992). Institutional embeddedness and the dynamics of organizational populations. *American Sociological Review*, 57(4), 540-559.

- Becattini, G. (1990). The Marshallian industrial district as a socio-economic notion. In: F. Pyke, G. Becattini & W. Sengenberger (eds.). *Industrial districts and inter-firm co-operation in Italy*. ILO Publications, Geneva, 37-51.
- Benkler, Y. (2006). *The wealth of networks: how social production transforms markets and freedom*. New Haven: Yale University Press.
- Bourdieu, P. (1991). The forms of capital. In: G.P. Richardson (ed.). *Feedback Thought in Social Science and Systems Theory*, University of Pennsylvania Press, Philadelphia, 241-258.
- Bouwman, H. & Hulsink, W. (2000). Naar een dynamisch model voor ICT-clustering. In: H. Bouwman & W. Hulsink (eds.). *Silicon Valley in de Polder: ICT-Clusters in de Lage Landen*. Lemma, Utrecht, 375-406.
- Breschi, S. & Lissoni, F. (2001a). Localised knowledge spillovers vs. innovative milieu: knowledge “tacitness” reconsidered. *Papers in Regional Science*, 80, 255-273.
- Breschi, S. & Lissoni, F. (2001b). Knowledge spillovers and local innovation systems: a critical survey. *Industrial and Corporate Change*, 10(4), 975-1005.
- Breschi, S. & Malerba, F. (2001). The geography of innovation and economic clustering: some introductory notes. *Industrial and Corporate Change*, 10(4), 817-833.
- Bresnahan, T., Gambardella, A. & Saxenian, A. (2001). ‘Old economy’ inputs for ‘new economy’ outcomes: cluster formation in the new Silicon Valleys. *Industrial and Corporate Change*, 10(4), 835-860.
- Brown, J.S. & Duguid, P. (2000). Mysteries of the region: knowledge dynamics in Silicon Valley. In: W.F. Millar, Ch.-M. Lee, M.G. Hancock & H.S. Rowen (eds.). *The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship*. Stanford University Press, US, 16-38.
- Conway, C., Dawley, S. & Charles, D. (2005). An investigation of the learning dynamics involved within the creative industries sector in the Newcastle city region. *Working Paper June 2005*, 1-19.
- Dahl, M.S., Pedersen, Ch.Ø.R. & Dalum, B. (2005). Entrepreneurial founder effects in the growth of regional clusters: how early success is a key determinant. *Danish*

- Research Unit for Industrial Dynamics (Druid): Druid working paper 05-18*, 1-22.
- Den Hertog, P., Brouwer, E., & Maltha, S. (2000). *Innovation in an adolescent cluster: the case of the Dutch multimedia cluster*. Paper prepared for the 3rd OECD Cluster Focus Group Workshop "Do Clusters Matter in Innovation Policy?", May 8-9, Utrecht.
- Den Hertog, P. & Maltha, S. (1999). The emerging information and communication cluster in the Netherlands. In: OECD, *Boosting Innovation: The Cluster Approach*. OECD Publications: Paris, 193-218.
- Elfring, T. & Hulsink, W. (2003). Networks in entrepreneurship: the case of high-technology firms. *Small Business Economics*, 21(4), 409-422.
- Feldman, M.P. (2001). The Entrepreneurial Event Revisited: Firm Formation in a Regional Context. *Industrial and Corporate Change*, 10(4), 861-891.
- Feldman, M.P. & Florida, R. (1994). The geographic sources of innovation: technological infrastructure and product innovation in the US. *Annals of the Association of American Geographers*, 84(2), 210-229.
- Feldman, M.P. & Francis, J.L. (2004). Homegrown Solutions: Fostering Cluster Formation. *Economic Development Quarterly*, 18(2), 127-137.
- Flew, T. (2005). *New media. An Introduction*. Singapore: Oxford University Press.
- Florida, R. (2002). *The rise of the creative class. And how it's transforming work, leisure, community, and everyday life*. New York: Basic Books.
- Florida, R. (1995). Toward the learning region. *Futures*, 27(5), 527-536.
- Fuchs, G. (2000). The role of geography in the information economy: the case of multimedia. *Vierteljahrshefte zur Wirtschaftsforschung*, 69(4), 559-573.
- Gertler, M.S. (2003). Tacit knowledge and the economic geography of context, or the undefinable tacitness of being (there). *Journal of Economic Geography*, 3, 75-99.
- Gertler, M.S. & Levitte, Y.M. (2003). *Local nodes in global networks: the geography of knowledge flows in biotechnology innovation*. Paper presented at the Druid Summer Conference 2003 on Creating, Sharing, and Transferring Knowledge. The Role of Geography, Institutions and Organizations. June 12-14, Copenhagen (Denmark).

- Globerman, S., Shapiro, D. & Vining, A. (2005). Clusters and intercluster spillovers: their influence on the growth and survival of Canadian information technology firms. *Industrial and Corporate Change*, 14(1), 27-60.
- Gordon, I.R. & McCann, Ph. (2000). Industrial clusters: complexes, agglomeration and/or social networks? *Urban Studies*, 37(3), 513-532.
- Grabher, G. (2002). The project ecology of advertising: tasks, talents and teams. *Regional Studies*, 36(3), 245-262.
- Granovetter, M.S. (1985). Economic action and social structure: the problem of embeddedness. *The American Journal of Sociology*, 91(3), 481-510.
- Greve, A. & Salaff, J.W. (2003). Social networks and entrepreneurship. *Entrepreneurial Theory and Practice*, Fall, 1-22.
- Gulati, R. & Gargiulo, M. (1999). Where do interorganizational networks come from? *The American Journal of Sociology*, 104(5), 1439-1493.
- Håkanson, L. (2003). Epistemic communities and cluster dynamics: on the role of knowledge in industrial districts. Paper presented at: *Druid Summer Conference 2003 on Creating, Sharing, and Transferring Knowledge. The Role of Geography, Institutions and Organizations*. Copenhagen, June 12-14, 1-25.
- Hoogland, W. (2008). **ICT en Nieuwe Media in Noordvleugel Randstad. Een verkenning in opdracht van Platform Bèta en Techniek**. Research report.
- Hoogland, W. (2006). **Investeren in verbindingen. Visie op de ontwikkeling van ICT en Nieuwe Media in de Noordvleugel**. Research report.
- Immovator, (2006). *Cross media monitor 2006. ICT en creatieve industrie in de Noordvleugel: Bedrijvigheid, innovatiekansen en perspectieven*. Haarlem: AllinPrint
- Immovator, (2008). *Cross media monitor 2008. ICT en creatieve industrie in de Noordvleugel: Bedrijvigheid, innovatiekansen en perspectieven*. Haarlem: AllinPrint
- Jacobs, J. (1969). *The economy of cities*. New York: Vintage Books.
- Kenney, M. & Von Burg, U. (1999). Technology, Entrepreneurship and Path Dependence: Industrial Clustering in Silicon Valley and Route 128. *Industrial and Corporate Change*, 8(1), 67-103.

- Kogut, B. & Zander, U. (1996). What firms do? Coordination, identity, and learning. *Organization Science*, 7(5), 502-518.
- Kogut, B. & Zander, U. (1993). Knowledge of the firm and the evolutionary theory of the multinational corporation. *Journal of International Business Studies*, 24(4), 625-645.
- Kogut, B. & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science*, 3(3), 383-397.
- Krugman, P. (1991). *Geography and trade*. Cambridge, MA: The MIT Press.
- Leisink, P. (2000). Multimedia industry networks and regional economic development policies: the case of the Netherlands. *Vierteljahrshefte zur Wirtschaftsforschung*, 69(4), S. 574-586.
- Lorenzen, M. (2005). Knowledge and geography. *Industry and Innovation*, 12(4), 399-407.
- Marceau, J. (1999). The disappearing trick: clusters in the Australian economy. In: Organisation for Economic Co-operation and Development (OECD). *Boosting Innovation: The Cluster Approach*, 155-173.
- Marshall, A. (1920 [1890]). *Principles of economics*. London: MacMillan.
- Martin, R. & Sunley, P. 2003. Deconstructing clusters: chaotic concept or policy panacea? *Journal of Economic Geography*, 3, 5-35.
- Maskell, P. (2001). Towards a knowledge-based theory of the geographical cluster. *Industrial and Corporate Change*, 10(4), 921-943.
- Maskell, P. & Kebir, L. (2005). What qualifies as a cluster theory? *Danish Research Unit for Industrial Dynamics (Druid): Druid working paper 05-09*, 1-22.
- Miles, I. (1997). Cyberspace as product space: interactive learning about interactive media. *Futures*, 29(9), 769-789.
- Morgan, K. (2001). The exaggerated death of geography: localised learning, innovation and uneven development. Paper presented to: *The Future of Innovation Studies Conference*, The Eindhoven Centre for Innovation Studies, Eindhoven University of Technology, 1-33.
- Morgan, K. (1997). The learning region: institutions, innovation and regional renewal. *Regional Studies*, 31(5), 491-503.

- Morse, J.M. (2003). Principles of Mixed Methods and Multimethod Research Design. In: A. Tashakkori & C. Teddlie (eds.). **Handbook of mixed methods in social and behavioral research**. Sage Publications, Thousand Oaks, 189-208.
- Nordenflycht, A. Von (2010). What is a professional service firm? Toward a theory and taxonomy of knowledge-intensive firms. **Academy of Management Review**, 35(1), 155-174.
- OECD (2002). **Innovative people**. Paris: OECD Publications.
- Oinas, P. (1999). Activity-specificity in organizational learning: implications for analysing the role of proximity. **GeoJournal**, 49, 363-372.
- Owen-Smith, J. & Powell, W.W. (2004). Knowledge networks as channels and conduits: the effects of spillovers in the Boston biotechnology community. **Organization Science**, 15(1), 5-21.
- Piore, M.J. & Sabel, Ch.F. (1984). **The second industrial divide. Possibilities for prosperity**. USA: Basic Books.
- Polanyi, M. (1967). **The tacit dimension**. London: Routledge & Kegan Paul Ltd.
- Porter, M.E. (1998b). Clusters and the new economics of competition. **Harvard Business Review**, November-December, 77-90.
- Porter, M.E. (1990). **The competitive advantage of nations**. New York: The Free Press.
- Power, D. & Lundmark, M. (2004). Working through knowledge pools: labour market dynamics, the transference of knowledge and ideas, and industrial clusters. **Urban Studies**, 41, 5/6, 1025-1044.
- Quévit, M. & Van Doren, P. (1997). The problem of innovative milieux and territorial structural adjustment policies. In: R. Ratti, A. Bramanti & R. Gordon (eds.). **The Dynamics of Innovative Regions. The Gremi Approach**. Ashgate, Aldershot, 343-365.
- Rogers, E.M. (1995). **Diffusion of innovations**. New York: The Free Press.
- Rosenfeld, S.A. (1997). Bringing business clusters into the mainstream of economic development. **European Planning Studies**, 5(3), 3-23.
- Rutten, P., Manshanden, W., Muskens, J., & Koops, O. 2004. De creatieve industrie in Amsterdam en de regio. **TNO Rapport STB-04-29**, 1-64.

- Saxenian, A. (2006). *The new Argonauts. Regional advantage in a global economy*. Cambridge: Harvard University Press.
- Scott, A.J. (2006). Creative cities: conceptual issues and policy questions. *Journal of Urban Affairs*, 28(1), 1-17.
- Scott, A.J. (1996). The craft, fashion, and cultural-products industries of Los Angeles: competitive dynamics and policy dilemmas in a multisectoral image-producing complex. *Annals of the Association of American Geographers*, 86(2), 306-323.
- Simard, C. & West, J. (2006). Knowledge networks and the geographic locus of innovation. In: H. Chesbrough, W. van Haverbeke & J. West (eds.). *Open Innovation: Researching a New Paradigm*. Oxford University Press, UK.
- Sole, D. & Edmondson, A. (2002). Situated knowledge and learning in dispersed teams. *British Journal of Management*, 13, S17-34.
- Sorenson, O. (2003). Social networks and industrial geography. *Journal of Evolutionary Economics*, 13, 513-527.
- Sorenson, O. (2003b). Social networks, informational complexity and industrial geography. In: D. Fornahl & C. Zellner (eds.). *The Role of Labor Mobility and Informal Networks for Knowledge Transfer*. Kluwer Academic Publishers, the Netherlands, 1-16.
- Swann, P. & Prevezer, M. (1996). A comparison of the dynamics of industrial clustering in computing and biotechnology. *Research Policy*, 25, 1139-1157.
- Tashakkori, A. & Teddlie, C. (1998). *Mixed methodology: combining qualitative and quantitative approaches*. Thousand Oaks: Sage Publications.
- Thrift, N. & Olds, K. (1996). Refiguring the economic in economic geography. *Progress in Human Geography*, 20, 311-337.
- Uzzi, B. (1996). The sources and consequences of embeddedness for the economic performance of organizations: the network effect. *American Sociological Review*, 61(4), 674-698.
- Von Hippel, E. (1994). "Sticky Information" and the locus of problem solving: implications for innovation. *Management Science*, 40(4), 429-439.
- Von Hippel, E. (1987). Cooperation between rivals: informal know-how trading. *Research Policy*, 16, 291-302.

- West, J., Vanhaverbeke, W. & Chesbrough, H. (2006). Open innovation: a research agenda. In Chesbrough, H., Vanhaverbeke, W. & West, J. (eds.). ***Open innovation: researching a new paradigm***. Oxford: Oxford University Press.
- Wever, E. & Stam, E. (1998). Clusters of high technology SMEs: the Dutch case. ***Regional Studies***, 33(4), 391-400.
- Wolfe, D.A. & Gertler, M.S. (2004). Clusters from the inside and out: local dynamics and global linkages. ***Urban Studies***, 41(5/6), 1071-1093.
- Zander, U. & Kogut, B. (1995). Knowledge and the speed of the transfer and imitation of organizational capabilities: an empirical test. ***Organization Science***, 6(1), 76-92.
- Zaheer, A. & Bell, G.G. (2005). Benefiting from network position: firm capabilities, structural holes, and performance. ***Strategic Management Journal***, 26, 809-825.